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# BRAZIL'S FUTURE AS A WHEAT PRODUCER



U. S. DEPARTMENT OF AGRICULTURE

7 (U.S. Foreign Agricultural Service,

FAS - M - 60)




## FOREWORD

Brazil is the largest wheat importer in Latin America. Imports in recent years have ranged from 50 million to 70 million bushels annually, mainly from Argentina, the United States, and Uruguay. In the late 1930's the government initiated a program aimed at making the country less dependent on foreign sources of supply. The main objective was to reduce the drain on foreign exchange resulting from increasing imports of wheat and assure sufficient exchange for financing imports of raw materials and equipment needed for the country's expanding industrial production.

Brazil figured as a market for only small quantities of U.S. wheat and flour before World War II. During the 5-year period ending with 1957-58 (July-June), our exports to that market averaged 10,360,000 bushels (grain equivalent) annually--wheat averaging 9,720,000 bushels and flour 640,000 bushels. In the same period, annual sales by Argentina, our principal competitor in the Brazilian market, averaged 34,000,000 bushels.

This survey was made with a view to bringing to a focus the results of Brazil's wheat expansion program to date, prospects for further expansion, and related developments likely to affect the competitive status of U.S. wheat and flour in that market. It is based mainly on official records of Brazil and reports from the agricultural attaché, American Embassy, Rio de Janeiro.

  
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July 1959

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# Brazil's Future as a Wheat Producer

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## Summary and Conclusions

Up until the midforties the wheat and flour requirements of Brazil were met largely by imports from Argentina, the United States, Uruguay, and Canada. Competition from production in Brazil itself was insignificant. During the 5-year period ending with 1945, for example, the country depended on imports for 85 percent of its requirements. During the preceding 5-year period, it depended on them for 88 percent.

In the meantime such factors as population growth, industrialization, labor movements from rural to urban areas, higher incomes, and improvements in purchasing power and dietary standards resulted in a large increase in total requirements--and in imports. This constituted a serious drain on foreign exchange supplies.

In order to carry out its industrial expansion, Brazil needed all of the foreign exchange it could get, especially dollars, for capital goods, raw materials, and equipment that could not be produced at home. The government, therefore, decided, to embark upon a wheat expansion program to reduce the country's dependence on imported wheat. Its success is indicated by the fact that production was expanded from the 1935-39 average of 135,000 metric tons to a peak of 1.1 million tons in 1955.

Since then, it has gone down some, but further increases may be anticipated. They will be at a much slower rate, however, because of increasing costs and competition for use of the land for other agricultural enterprises. Moreover, production is not likely to increase as rapidly as consumption. At the current rate of population growth, requirements may total 4.0 million metric tons by 1970. There is little likelihood of production's increasing enough by that time to take care of more than 30 to 35 percent of the needs. The balance will have to be imported.

## Production

Only a relatively small part of Brazil possesses the combination of soil, climatic conditions, and topography suitable for wheat. Production is confined almost entirely to the southern part of the country; in fact, about 85 percent of the crop is grown in the State of Rio Grande do Sul, the southernmost State. About 9 percent is grown in adjoining State of Santa Catarina on the north, and virtually all of the rest in Paraná and São Paulo.

Within these States, wheat production is an important agricultural enterprise in two distinct geographical sections. One is known as the zona colonial and the other, as the zona de campo. Both have their own particular characteristics--different kinds of soil, farming practices, land tenure systems, and such.

### Zona Colonial

Up until the 1920's, production was confined mainly to the so-called zona colonial. These are mountainous areas in Rio Grande do Sul, Santa Catarina and Paraná, where small holdings with relatively little mechanization predominate and where farming techniques have tended to remain about the same as those practiced by the first settlers. Techniques of soil conservation and scientific crop rotation are virtually unknown. Now, considerably less than half of the country's wheat area is in these districts.

Average size of holdings in the zona colonial range from 65 to 90 acres, but the manpower needed for any crop and relative shortage of labor limit the area under cultivation to 12 to 18 acres, the maximum that can be handled by members of the family. About a third of the cultivated area on each farm is used for wheat and the remainder for other crops, chiefly corn. A diversified type of farming prevails in these districts.

Left to their own devices and receiving little governmental assistance, farmers in zona colonial districts for many years produced only enough wheat to supply their own needs plus such





Annual wheat festival in Brazil's most important wheat-producing state, Rio Grande do Sul. Left, farm machinery display. Above, parade of the farmers' own combines. Brazil's wheat growers prefer large self-propelled combines like these. They rarely pool their labor and machinery or harvest, and have little custom combining done.

additional quantities as could be readily marketed in nearby consuming centers.<sup>1</sup> On many of the farms, wheat holds only a secondary place, being grown mainly as a subsistence crop. As a result, production in such districts has remained virtually stationary, fluctuating only in accordance with weather conditions.

Possibilities of expanding the area under wheat in the zona colonial of the State of Rio Grande do Sul have long since been exhausted, but considerable areas suitable for wheat still remain in such districts in the States of Santa Catarina and Paraná. In general, however, there appears to be little prospect of a substantial acreage expansion in these districts in the near future. The principal reasons are reclamation problems resulting from the woody, hilly, and sometimes precipitous topography; high costs of developing additional areas for wheat; shortage of manpower; inadequate transportation and storage facilities; and the virtual impossibility of mechanization.

Some increase in production in such districts may be possible, however, without a substantial increase in acreage. This will depend on adoption of more intensive farming within areas already under cultivation; introduction of modern production techniques; propagation and use of seed especially suitable for those areas; availability and increased use of fertilizers and pesticides; adoption of soil conservation and appropriate crop rotation practices; provision of a liberal system of credits; increased technical assistance; development of transportation and storage facilities; and assurance of a high enough price to justify increased attention to the crop.

<sup>1</sup>Economic Bulletin for Latin America, Vol. II, No. 1, published by the Secretariat of the Economic Commission for Latin America, United Nations, February 1957.



## Zona de Campo

While still accounting for a substantial part of Brazil's wheat crop, the mountainous areas have long since given way to the prairie lands of the zona de campo as the country's major producing area. These are natural grasslands with a gently rolling topography interspersed with woodlands. Formerly, they were used almost exclusively for livestock grazing.

In contrast with the zona colonial, where small holdings and relatively little mechanization prevail, wheat growing in the zona de campo is characterized by medium to large-sized farms with highly mechanized operations. In the zona de campo area of Rio Grande do Sul, the principal wheat growing State, most of the wheat growers operate farms ranging between 750 to 1,250 acres in size, with an average of about 600 acres under wheat. The tendency has been for wheat production in such districts to become largely a one-crop enterprise with all of its economic drawbacks.

In the past, wheat production in zona de campo areas was impeded by three adverse factors--poverty of the soil, its high degree of acidity, and a manpower shortage. On the other hand, these areas offered certain counterbalancing advantages--a more propitious climate for wheat, a topography favorable to mechanization, which would help to offset the labor shortage, and possibilities for developing medium and large-scale farms. When government price supports and control of imports were inaugurated in order to make wheat production a profitable enterprise, large areas of land in the zona de campo began to be shifted from livestock grazing to wheat production, the latter under almost complete mechanization. Most of the country's wheat crop now is grown in those districts.

Only about 30-40 percent of the wheat farms in the zona de campo are actually operated by owners. Approximately 5 percent are run on a sharecropping basis. The remainder are rented to entrepreneurs who have been attracted by prospects of high returns under the government's wheat price support policy. These are mainly "suitcase farmers" who probably would quickly withdraw from the wheat growing business were it not for the government's policy of guaranteeing an assured market for the crop at a minimum price and other governmental incentives.

A considerable area, estimated at approximately 10 million to 12.5 million acres, is available for wheat production in zona de campo districts of Brazil. However, local experts believe that if a sound system of farm management is to be adopted, including proper rotation of wheat with fodder and other crops, maintenance of a satisfactory balance between crop and livestock production, and investment of more of the profits in improvements of a permanent nature, it would be inadvisable to use more than 3-3/4 million to 5 million acres of land for that purpose. At average yields, this eventually could mean a crop of from 1.2 million to 1.5 million tons.

## Wheat Expansion Program

The determination of the government to bring about an expansion in the country's wheat production and the subsequent conversion to wheat of large areas in the traditional livestock producing regions of the zona de campo reflect the impact of a number of factors. Outstanding were failure of domestic production to keep pace with increasing requirements; disturbances to the country's international balance of payments because more and more of its foreign exchange resources had to be used to finance imported wheat; and need to reduce the drain on foreign exchange in order to assure sufficient foreign currencies for purchases of raw materials and equipment needed for the country's expanding industrialization.

The government, therefore, embarked upon a wheat expansion program, establishing in the late 1930's the Serviço de Expansão do Trigo (Wheat Expansion Service) to implement it. This agency has met with remarkable success. The methods used to accomplish its objectives include the following:

- (1) Determination of areas where climate, soil, topography, and other factors appeared to be favorable for wheat production;
- (2) Establishment of experiment stations for development of higher yielding varieties and types best suited to local soil and climatic conditions;
- (3) Establishment of soil testing laboratories to collect and analyze soils and conduct experiments with a view to determining necessary soil treatment and kinds and quantities of fertilizers to be used in various producing areas;

(4) Experimental planting by wheat development agencies in the various States of recommended varieties with a view to the production and distribution to growers of selected seeds found to be especially suitable to local conditions;

(5) Establishment and operation of facilities to determine incidence on wheat production of wheat diseases, harmful plants, and insect pests, and conduct research and experimentation for their eradication or control;

(6) Facilitation of credit advances to growers for the purchase of such production requisites as fertilizers, seed, machinery, and bags;

(7) Development of a program for improving storage and transportation facilities;

(8) Establishment of favorable exchange rates for importation of agricultural machinery, fertilizers and insecticides;

(9) Establishment of facilities for renting agricultural machinery;

(10) Arrangements for insurance against crop damage by grasshoppers, wind, fire, hail, and bad weather. (However, premiums are considered to be too high);

(11) Organization of wheat growers' cooperatives;

(12) Guaranteed priority of transport for wheat by all transportation agencies;

(13) Assurance of a high enough price for home-grown wheat to encourage acreage expansion;

(14) Assurance of a market for national wheat through fixed allocations of home-grown wheat to individual flour mills;

(15) Governmental control of wheat and flour imports and refusal of deliveries of imported wheat to flour mills until their fixed quotas of national wheat have been purchased;

(16) Publication and distribution to growers of literature informing them of the results of wheat research and experiments in the various States, and making recommendations with respect to varieties to plant, optimum planting dates, quantities and kinds of fertilizer needed, desirable crop rotations, and soil and water conservation practices; and

(17) Technical assistance aimed at encouraging the best possible production techniques and efficient use of mechanical equipment.

Guaranteed Minimum Price.--In the expansion program, chief reliance is placed on the incentive of a minimum price to growers. The government itself does not purchase home-grown wheat. Instead, it operates a system under which each year's commercial crop must be purchased by mills at not less than a specified price.

In order to assure sale of the crop at the desired price, the Wheat Expansion Service each year fixes a total wheat quota for each individual mill. It also fixes the minimum quantity of national wheat a mill must purchase, and the supplementary quota of foreign wheat it may purchase within its total quota. A mill may purchase more than its specified quota of national wheat but not less. Wheat importation is the sole prerogative of the government. Foreign wheat now is sold to mills by the government at approximately the same price as the minimum which mills have to pay growers for national wheat.

Details of the price support program for the 1958-59 crop were promulgated in a decree of the Minister of Agriculture published in the government's *Diario Oficial* on November 12, 1958. The principal features of the decree follow.

(1) Having in mind the country's production of wheat and its consumption needs, the Wheat Expansion Service shall set the quotas of national wheat to be acquired by mills as well as the supplementary quotas of foreign wheat which will be assigned to them during 1959.

(2) Mills may buy more than their allocated quotas of national wheat, but any quantities purchased in excess of those quotas will be deducted from their quotas of foreign wheat.

(3) Mills failing to subscribe fully to their quotas of national wheat must make up the deficit with foreign wheat, after the entire national crop has been placed, against payment of Cr\$85 per 60 kilos over the selling price set by the government for imported wheat.

(4) The basic 1959 producer price for dry and clean national wheat running 78 kilos per hectoliter is Cr\$500.00 per 60 kilos delivered in bulk at interior points. There are premiums or deductions for wheat running above or below that weight. Checking of hectoliter weight must be done at local delivery points by an agent of the Wheat Expansion Service in the presence of those directly interested, or their delegates. The minimum 1959 price payable by mills for national wheat (corresponding prices for 1958 added for comparison) follow:

(5) When the product is sold in bags, optional to the seller, the price is increased, according to the value of the bag, up to a maximum of Cr\$30 per 60 kilos.

TABLE 1.--Wheat: Minimum producer price for Brazilian wheat at interior points, 1958 and 1959

Weight		Guaranteed minimum price			
		1958		1959	
<i>Kilo per hectoliter</i>	<i>Pounds per bushel</i>	<i>Cruzeiros per 60 kilos</i>	<i>Dollars per bushel <sup>1</sup></i>	<i>Cruzeiros per 60 kilos</i>	<i>Dollars per bushel <sup>1</sup></i>
84	65.3	424	2.87	518	2.55
83	64.5	420	2.84	515	2.54
82	63.7	416	2.82	512	2.52
81	62.9	412	2.79	509	2.51
80	62.1	408	2.76	506	2.49
79	61.4	404	2.74	503	2.48
78	60.6	400	2.71	500	2.47
77	59.8	396	2.68	497	2.45
76	59.0	392	2.65	494	2.44
75	58.3	388	2.63	491	2.42
74	57.5	384	2.60	488	2.41
73	56.7	380	2.57	485	2.39
72	55.9	376	2.51	482	2.38

<sup>1</sup> Conversions into dollar equivalents have only limited significance because of Brazil's multiple exchange system. They are made here at rates prevailing for imports of U.S. wheat under P.L. 480 at the time harvesting was completed, i.e., at 67 cruzeiros to the dollar on Dec. 31, 1957, and 92 cruzeiros on Dec. 31, 1958.

(6) Prices will be increased by Cr\$5.00 per 60 kilos for purchases made after January 31, 1959.

(7) When national wheat is to be delivered at coastal ports in the States of Rio Grande do Sul, Santa Catarina, and Paraná, or at Porto Alegre and Pelotas, the price will be increased by Cr\$50.00 per 60 kilos to cover transportation expenses. This sum is to be included in the bill of purchase and will be paid to the grower by the Bank of Brazil S.A. It does not apply to purchases made by mills located in the interior of the States of Rio Grande do Sul, Santa Catarina and Paraná.

(8) In addition, the wheat grower is assured a fixed bonus of Cr\$50.00 per 60 kilos over the minimum price for the 1959 crop. This bonus, which is to be included in the bill of purchase, will also be paid by the Bank of Brazil.

(9) The money for transportation expenses and the fixed bonus above referred to will initially be debited by the Bank of Brazil to the mill making the purchase, but will be annulled against presentation of the following documents:

(a) For mills in the States of Rio Grande do Sul, Santa Catarina, and Paraná, documents proving payment of the sales tax on flour extracted from the wheat sold to them; and

(b) For all other mills, maritime or railroad bills of lading for the national wheat transported.



(10) Upon presentation of shipping documents, the Bank of Brazil S.A. will pay mills that receive national wheat through the following ports the indicated sums per 60 kilos to cover transportation expenses: Vitória, Cr\$40.00; Salvador, Cr\$14.00; Recife, Cr\$20.00; Cabedelo, Cr\$22.00; Natal, Cr\$23; Fortaleza, Cr\$28.00; and Belém, Cr\$41.00.

(11) During the current (1959) year, the government's selling price for imported wheat is Cr\$500.00 per 60 kilos in bulk, c.i.f. maritime ports and those of Pelotas and Porto Alegre. The price will be increased by Cr\$30.00 per 60 kilos when the wheat is sold in bags.

(12) Mills located in the States of Rio Grande do Sul, Santa Catarina, and Paraná will not receive foreign wheat until presentation of documents certifying to payment of the sales tax on flour extracted from the national wheat sold to them.

Results of the Wheat Expansion Program.--The country's wheat expansion program has been highly successful, but probably not as spectacularly so as the official figures would indicate; for, according to Brazil's wheat and flour trade, acreage and production figures since the 1930's have been too high<sup>2</sup>. Official estimates of the Ministry of Agriculture show that the area planted to wheat in 1955 was 614 percent greater than in 1935-39, and that production was 713 percent greater. Because of belief that official acreage and production figures during the past 25 years have been too high, the trade now usually adjusts them downward for purposes of a more realistic determination of supplies and requirements.

Since then, production has declined because of unfavorable weather and disease damage. The official preliminary estimate placed the planted area for the November-December 1958 harvest at 1,291,454 hectares (3.2 million acres) and the crop at 1,154,514 tons (42.4 million bushels). The Ministry of Agriculture subsequently announced that the crop probably amounted to only 450,000 tons (16.5 million bushels). Trade estimates place it at an even lower figure.

## Consumption

Increased purchasing power as a result of industrial expansion and movement of workers from rural to urban areas to take advantage of better employment opportunities has resulted in a gradual upgrading in the average Brazilian diet during the past two decades. This trend is expected to continue.

There is, of course, a great variation in diets among the various population groups and geographic areas of the country. Diets of the lower-income families are largely mandioca, rice, beans, corn, potatoes, and fruits and vegetables supplemented by a little meat and fish. But the upward trend in per capita incomes in large centers of population is resulting in a more diversified diet, including more wheat products as well as more meat and dairy products.

### Per Capita Consumption

Although apparent per capita disappearance of wheat shows occasional short-term reductions, either because of import difficulties or short domestic crops, the trend has been definitely upward. To the extent that official production figures plus imports are indicative of effective demand, the country's overall wheat consumption has more than doubled. Despite greatly increased population, apparent per capita disappearance increased from the 1936-40 average of 29 kilos (63.9 pounds) to a peak of 47 kilos (103.6 pounds) in 1955, an increase of more than 62 percent.

Official figures on commercial availabilities of flour (i.e., millings from home-grown and imported wheat plus flour imports) afford additional evidence of the trend. These show that apparent per capita disappearance of flour increased from the 2-year (1939 and 1940) average of 25.4 kilos grain equivalent to 48.6 kilos grain equivalent in 1955.

Because of a reduction in domestic wheat production and a somewhat lower level of imports, apparent per capita disappearance has declined since that time. Largely as a result of a very poor crop harvested at the end of 1958, total supplies in 1959 are not expected to be large enough to permit an average disappearance of more than 35 kilos per capita despite expectations of substantially increased imports. This, however, is not likely to be more than a temporary setback.

<sup>2</sup> The overestimates are believed to have stemmed in part from difficulties associated with assembling, checking, recording, and revising data pertaining to acreage, yield, and production; in part from opportunities in the past for profits by producer and dealer falsification of statistics pertaining to wheat transactions; and in part from nationalization of considerable quantities of imported wheat and its subsequent sale at the relative high prices mandatory for the home-grown product. The government recently has taken action to reduce these practices, locally referred to as transactions in paper wheat, to a minimum.

TABLE 2.--Wheat: Area and production by Brazil's principal producing States, averages, 1925-54, annual, 1950-58

Years	São Paulo	Paraná	Santo Catarina	Rio Grande do Sul	Others	Total
AREA						
Average:	Hectares <sup>1</sup>	Hectares <sup>1</sup>	Hectares <sup>1</sup>	Hectares <sup>1</sup>	Hectares <sup>1</sup>	Hectares <sup>1</sup>
1925-29.....	--	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	113,996
1930-34.....	--	<sup>3</sup> 25,530	<sup>3</sup> 5,735	<sup>3</sup> 130,248	<sup>3</sup> 72	158,811
1935-39.....	--	19,342	11,489	136,733	55	167,619
1940-41.....	2,131	16,536	40,663	213,583	1,192	274,105
1945-49.....	542	29,969	69,350	332,027	2,988	434,876
1950-54.....	3,556	65,163	128,028	638,344	654	835,744
Annual:						
1950.....	2,672	56,893	101,481	490,139	1,268	652,453
1951.....	3,150	58,377	105,875	557,190	333	724,875
1952.....	5,270	62,676	135,941	604,971	721	809,579
1953.....	3,825	72,117	150,404	683,507	561	910,414
1954.....	2,863	75,755	146,438	855,964	377	1,081,397
1955.....	3,489	70,331	139,575	982,484	184	1,196,063
1956.....	4,653	70,877	91,453	718,288	302	885,573
1957.....	7,706	85,325	110,248	949,544	694	1,153,517
1958.....	6,723	90,250	109,640	1,083,886	955	1,291,454
PRODUCTION						
Average:	Metric tons <sup>4</sup>	Metric tons <sup>4</sup>	Metric tons <sup>4</sup>	Metric tons <sup>4</sup>	Metric tons <sup>4</sup>	Metric tons <sup>4</sup>
1925-29.....	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	( <sup>2</sup> )	129,195
1930-34.....	--	<sup>3</sup> 23,137	<sup>3</sup> 4,180	<sup>3</sup> 123,690	<sup>3</sup> 599	155,393
1935-39.....	--	17,651	8,803	108,971	60	135,485
1940-41.....	667	13,777	33,768	139,573	966	188,751
1945-49.....	325	25,504	66,298	236,116	1,320	329,563
1950-54.....	2,222	48,927	112,453	493,818	285	657,705
Annual:						
1950.....	1,615	46,897	107,537	375,757	545	532,351
1951.....	2,423	38,102	72,178	310,756	187	423,646
1952.....	1,653	51,312	132,548	503,689	298	689,500
1953.....	3,107	50,416	138,114	579,863	192	771,692
1954.....	2,313	57,906	111,887	669,024	203	871,333
1955.....	2,896	54,687	141,760	901,835	137	1,101,315
1956.....	4,554	75,426	91,471	683,331	199	854,971
1957.....	5,727	67,017	93,609	614,200	590	781,143
1958.....	5,614	82,215	113,762	951,542	1,381	<sup>5</sup> 450,000

<sup>1</sup> Hectare = 2.471 acres.

<sup>2</sup> State breakdown not available.

<sup>3</sup> 4-year (1931-34) average. A breakdown by States is not available for 1930.

<sup>4</sup> 1 metric ton = 36.743 bushels.

<sup>5</sup> Ministry of Agriculture's first estimate placed the crop at 1,154,514 tons. This was subsequently reduced because of damage by bad weather and diseases.

Anuario Estatístico do Brasil except for 1958.

### Consumption in Urban Areas

Simple arithmetical determinations of apparent per capita disappearance admittedly fail to give an accurate picture of the quantity of wheat and wheat products that people actually eat. Ecological characteristics of different regions of the country, differences in per capita incomes in the various regions, and transportation and distribution problems result in wide divergencies in dietary habits.

TABLE 3.--Wheat: Official and adjusted estimates of Brazilian area, production and commercial availability, annual 1951-58

Years	Official estimate <sup>1</sup>		Adjusted estimate <sup>2</sup>		Commercial availability <sup>3</sup>
	Area	Production	Area	Production	
	<i>Hectares</i>	<i>Metric tons</i>	<i>Hectares</i>	<i>Metric tons</i>	<i>Metric tons</i>
1951-52.....	724,875	423,646	460,000	390,000	270,000
1952-53.....	809,579	689,500	495,000	420,000	288,093
1953-54.....	910,414	771,692	765,000	650,000	491,652
1954-55.....	1,081,397	871,332	780,000	625,000	441,804
1955-56.....	1,196,063	1,101,315	870,000	790,000	<sup>4</sup> 600,000
1956-57.....	885,573	854,971	1,065,000	960,000	<sup>5</sup> 745,000
1957-58.....	1,153,517	781,143	1,140,000	800,000	<sup>6</sup> 600,000
1958-59.....	1,291,454	<sup>7</sup> 450,000	1,290,000	300,000	<sup>8</sup> 200,000

<sup>1</sup> Brazilian Ministry of Agriculture.

<sup>2</sup> Calculated on basis of reported or estimated commercial availability plus an estimate for seed to be withheld for the next crop (at 100 kilos per hectare) and an additional allowance for home use and loss.

<sup>3</sup> As reported by Serviço de Expansão do Trigo except as otherwise noted.

<sup>4</sup> Reported at 735,000 tons but 135,000 tons believed to have been "paper wheat."

<sup>5</sup> Reported at 895,000 tons but 150,000 tons believed to have been "paper wheat."

<sup>6</sup> Reported at 800,000 to 850,000 tons but 200,000 to 250,000 tons believed to have been "paper wheat."

<sup>7</sup> The first official estimate placed the crop at 1,154,514 tons. That estimate was subsequently reduced because of severe damage by unfavorable weather and disease.

<sup>8</sup> Trade estimate.

The urban segment of the population receives the major share of the national income and provides the market for most of the domestically produced and imported wheat. Over the years, increases in consumption of wheat products have been closely associated with urban growth, higher levels of per capita incomes in urban centers, and the greater number of people living within reach of the supply facilities offered by the larger towns and cities.

According to the 1950 Census, 36 percent of the country's population lived in urban and suburban centers. The percentage today is undoubtedly higher because of heavy movements of workers from rural to urban areas to which they were attracted by better employment opportunities and prospects for higher wages in industry and in various supply and service activities.

Once located with paying jobs, newly arrived members of an urban community soon begin to adopt the food consumption patterns prevailing in their new location. This usually means the consumption of less mandioca, rice, corn, and beans and more wheat products. These trends are expected to continue in the future.

In the four wheat producing States of Southern Brazil, which contain 33 percent of the country's population, wheat products have long been a staple item in the diet of both urban and rural people. Thanks to improvements in distribution facilities and in income levels, they have become important also in the diet of many people living in the other States of the country, which produce little or no wheat at all. This is especially true of people living in the large centers of population of those States.

While the frontiers of consumption are steadily being extended beyond large population centers, there still are many people in small towns and remote areas where wheat is only a secondary item in the diet, or is entirely unknown. This is especially true in northeastern, northern, and western Brazil. The main reasons are traditional use there of such substitutes for wheat as manioc, rice, and corn, which can be produced locally; relatively low levels of per capita income; high costs because of distances from supplying centers; and inadequate transportation and storage facilities. These areas constitute a large potential market for wheat and flour.



TABLE 4.--Brazil: Population and apparent per capita consumption of wheat and flour, average 1936-40, annual 1941-1959

Period	Population	Total wheat supply and disappearance		Commercial flour supply and disappearance		
		Total <sup>1</sup>	Per capita	Total <sup>2</sup>	Per capita	
					As flour	Grain equivalent
Average:	<i>Thousands</i>	<i>Metric tons</i>	<i>Kilos</i>	<i>Metric tons</i>	<i>Kilos</i>	<i>Kilos</i>
1936-40.....	36,496	1,129,499	29	<sup>3</sup> 750,981	<sup>3</sup> 18.45	<sup>3</sup> 25.41
Annual:						
1941.....	42,069	1,021,378	24	752,930	17.88	24.63
1942.....	43,069	1,198,689	27	881,661	20.47	28.19
1943.....	44,093	1,294,717	29	852,065	19.32	26.61
1944.....	45,141	1,524,387	34	1,095,033	24.26	33.41
1945.....	46,215	1,456,102	31	1,079,488	23.36	32.17
1946.....	47,313	781,427	16	487,131	10.29	14.17
1947.....	48,438	1,213,302	25	758,077	15.65	21.55
1948.....	49,590	1,226,417	25	729,072	14.70	20.24
1949.....	50,769	1,392,036	27	816,533	16.08	22.15
1950.....	51,976	1,675,054	32	1,039,859	20.01	27.56
1951.....	53,212	1,924,849	36	1,182,725	22.23	30.62
1952.....	54,477	1,685,886	31	1,111,049	20.39	28.08
1953.....	55,772	2,346,991	42	1,505,737	26.99	37.18
1954.....	57,098	2,415,885	42	1,307,195	22.89	31.53
1955.....	58,456	2,724,805	47	2,060,541	35.25	48.56
1956.....	59,846	2,597,675	43	1,634,837	27.32	37.63
1957.....	61,268	2,329,983	38	1,630,522	26.61	36.65
1958.....	62,725	2,234,612	36	1,713,200	27.31	37.63
1959 <sup>4</sup> .....	64,216	2,253,000	35	( <sup>5</sup> )	( <sup>5</sup> )	( <sup>5</sup> )

<sup>1</sup> Crops harvested in the months of November-December of years immediately preceding those indicated plus imports during specified calendar years.

<sup>2</sup> Commercial milling from national and imported wheat plus flour imports.

<sup>3</sup> Average for 1939 and 1940. Flour production for 1936-38 is not available.

<sup>4</sup> FAS estimate.

<sup>5</sup> Not yet available.

Except as indicated in footnote 4, all figures on population and supplies (i.e., domestic production plus imports) are official data published in Anuario Estatístico do Brasil and in Comercio Exterior do Brasil.

### Control of Bread Prices

An important factor in the upward trend in wheat consumption has been the government's policy of preventing prices of bread from increasing as rapidly as those for rival items in the diet. An analysis of price relationships between bread and other competing foodstuffs in specified cities from 1938 through 1955 shows that they gradually became more favorable to bread. This has been an important factor in the increased consumption of bread and other wheat products. In some instances it has meant that substitutes were displaced altogether. However, millers still are required by law to produce a flour that contains a 5 percent admixture of mandioca flour.

Food prices vary widely from region to region, owing to differences in available supplies, distribution facilities, dietary standards, employment levels, and consumer incomes, but in general they have moved upward in recent years. Bread prices have moved up, too, but not so much as prices for most other foods.

### Future Wheat Requirements

The belief is, that effective demand for wheat will continue to increase. The principal reasons are population growth, continued movement of workers from rural to urban areas in order to

TABLE 5.--Average consumer and relative price of selected foodstuffs competing with bread in specified Brazilian cities, 1938-55

Year	Price per kilogram (cruzeiros)				Ratio of other food prices to bread prices		
	Manioc flour	Maize	Rice	Bread	Manioc flour	Maize	Rice
<b>Fortaleza and João Pessoa:</b>							
1938.....	0.70	0.40	1.60	2.70	0.27	0.16	0.58
1945.....	1.30	.92	2.72	3.00	.45	.31	.91
1948.....	1.90	1.50	3.90	7.80	.25	.20	.50
1949.....	2.60	1.50	4.50	7.50	.35	.20	.61
1950.....	2.60	1.40	4.50	6.80	.39	.21	.67
1951.....	3.80	2.05	5.00	6.90	.56	.30	.72
1952.....	4.50	2.90	5.80	8.25	.55	.35	.71
1953.....	5.15	3.60	9.50	7.95	.65	.45	1.19
1954.....	4.45	2.50	10.25	8.45	.53	.30	1.21
1955.....	4.60	2.95	11.20	9.70	.47	.30	1.15
<b>Rio de Janeiro and São Paulo:</b>							
1938.....	.95	.55	1.85	1.75	.54	.32	1.06
1945.....	1.54	1.26	3.40	2.72	.57	.46	1.25
1948.....	2.50	2.20	4.70	6.10	.41	.36	.77
1949.....	2.75	3.30	5.85	2.25	.52	.44	1.11
1950.....	2.70	2.15	5.60	4.50	.60	.48	1.24
1951.....	2.80	2.50	5.50	4.30	.65	.59	1.28
1952.....	4.60	3.20	7.05	5.50	.84	.58	1.28
1953.....	5.50	3.80	12.15	6.00	.92	.63	2.02
1954.....	5.60	4.15	14.25	7.10	.79	.58	2.01
1955.....	5.65	4.85	15.95	8.90	.63	.54	1.79

Source: The United Nation's Economic Commission for Latin America, Vol. 2, No. 1, "Economic Bulletin for Latin America", February 1957.

TABLE 6.--Bread and other selected foods: Average Retail Prices in principal cites of Brazil November 1953-57

Product	Unit	1953	1954	1955	1956	1957
		<i>Cruzeiros</i>	<i>Cruzeiros</i>	<i>Cruzeiros</i>	<i>Cruzeiros</i>	<i>Cruzeiros</i>
Sugar.....	Kg.....	5.30	7.90	9.50	13.00	13.00
Rice.....	Kg.....	11.90	13.20	14.50	18.10	22.10
Bananas.....	Doz.....	4.00	5.90	7.50	8.00	10.20
Lard.....	Kg.....	27.00	37.00	39.00	43.80	48.20
Potatoes.....	Kg.....	6.10	8.00	6.60	10.80	11.40
Coffee.....	Kg.....	39.80	55.00	51.50	56.50	64.50
Meat.....	Kg.....	24.20	33.30	41.00	43.50	44.20
Dried Meat.....	Kg.....	28.60	38.00	44.00	47.00	53.70
Manioc Flour.....	Kg.....	5.10	5.20	5.00	8.60	12.10
Beans.....	Kg.....	5.60	6.10	21.30	21.50	14.00
Milk.....	Lt.....	3.80	5.00	6.60	8.20	8.20
Butter.....	Kg.....	48.50	98.50	89.50	92.30	156.60
Eggs.....	Doz.....	15.50	17.90	20.50	29.20	34.40
Bread.....	Kg.....	10.00	10.00	10.00	18.00	18.00

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take advantage of better employment opportunities and higher wages, the tendency of such workers to consume the same foods as consumed by others, improvements in the transportation and distribution network, and gradual improvements in dietary standards.

Other supporting factors include belief that the government will continue its policy of encouraging increased production or at least maintaining it at current levels by means of price supports, although further increases will probably have to come mainly by improvements in yields; unlikelihood that the government will discontinue its policy of maintaining bread prices at favorable levels compared with such substitutes as mandioca, rice, and corn; and belief that the government will take steps to assure wheat and flour imports at a high enough level to compensate for deficits in local production.

The record shows that population has been increasing at a rate of 2.4 percent per annum. At that rate, the 1970 total will be approximately 84 million. With a continuation of the upward trend in consumer purchasing power and continued growth of the urban population, which is likely to constitute 40 to 45 percent of the total by 1970, per capita disappearances by that time should equal or even exceed the 1955 level of 47 kilos. On that basis, 1970 requirements would total approximately 4 million tons.

Per capita disappearance has leveled off in recent years mainly because imports were not increased sufficiently to compensate for a reduction in domestic production and an increase in population. Even if it remained at the currently reduced level of 35 kilos, which is hardly to be expected, 1970 requirements would be in the neighborhood of 3 million tons. A conservative forecast is that they will range between 3.8 million and 4.0 million tons by that time compared with the current level of 2.3 million tons.

### Imports

The Government of Brazil has obligated itself to adopt whatever means are necessary to protect the domestic wheat industry and assure priority for the sale and prompt industrial use of the home-grown product. This includes enforcement of regulations to prevent imported wheat and flour from interfering with marketing of the national product, an objective attained by fixing annual quotas of domestic and imported wheat to be used by individual mills. The government is the sole legal importer. Foreign wheat is not distributed to mills until they have purchased their quotas of national wheat.

Brazil traditionally has been the most important wheat importer in Latin America. Up until the midforties the country depended on imports for 85 to 90 percent of apparent consumption. By the midfifties the wheat expansion program had cut the percentage to somewhat less than 70 percent. Domestic production had increased by 713 percent, but at the same time consumption had increased to such an extent that the actual volume of imports had to be increased.

Reflecting the impact of such factors as population increases, industrial expansion, labor movements from rural to urban areas, higher average incomes, and improvements in dietary standards, Brazil's need for imported wheat and flour rose from the 1936-40 average of 994,000 tons to 1,496,000 tons grain equivalent in 1956, an increase of 51 percent. At the same time, apparent consumption rose from 1,129,000 tons to 2,598,000 tons--130 percent.

Because of the poor and low-quality crop harvested in November-December 1958, estimated in March 1959 by the Ministry of Agriculture at only 450,000 tons (trade estimates place the crop at 300,000 tons), imports of wheat and flour in 1959 will have to total at least 1.8 million tons (grain equivalent), about 350,000 tons more than in 1958, unless consumption is to be reduced. In recognition of this fact, the government announced early in January that measures would be taken to assure normal supplies in 1959. Subsequently the government removed restrictions on the use of imported wheat and purchased a large quantity from Argentina. At the same time, however, the Federal Price and Supply Agency (COFAP) authorized an increase of 35 percent in the price of flour and of 40 percent in the price of bread.

### Principal Competitors

Over the years, Brazil has depended mainly on Argentina, the United States, and Uruguay for the bulk of its wheat and flour imports. In some years, especially in the twenties, late forties, and early fifties, substantial quantities were also imported from Canada. During the 5-year period ending with 1955 Argentina accounted for 54 percent of the average imports, the United



TABLE 7.--Wheat: Production, imports, and apparent supply and disappearance, averages 1926-40, annual 1941-59

Year	Production <sup>1</sup>			Imports <sup>2</sup>	Composition of supply <sup>3</sup>			Population	Apparent dis- ap- pearance
	Area	Hectare yield	Crop		Total	Domestic	Imported		
	Hectares	Kilos	Metric tons	Metric tons	Metric tons	Percent	Percent	Thousands	Kilos
Average:									
1926-30.....	113,996	1,133	129,195	907,298	1,036,493	12	88	32,247	32
1931-35.....	158,811	978	155,393	893,348	1,048,741	15	85	35,688	29
1936-40.....	167,619	808	135,485	994,006	1,129,499	12	88	39,496	29
Annual:									
1941.....	201,090	506	101,739	919,639	1,021,378	10	90	42,069	24
1942.....	271,874	851	231,454	967,235	1,198,689	19	81	43,069	27
1943.....	277,265	782	216,867	1,077,850	1,294,717	17	83	44,093	29
1944.....	291,807	765	223,108	1,301,279	1,524,387	30	70	45,141	34
1945.....	328,487	519	170,586	1,285,516	1,456,102	12	88	46,215	31
1946.....	315,548	739	233,298	548,129	781,427	30	70	47,313	16
1947.....	300,842	706	212,514	1,003,788	1,216,302	18	82	48,438	25
1948.....	391,555	918	359,363	867,054	1,226,417	29	71	49,590	25
1949.....	536,334	755	405,135	986,901	1,392,036	29	71	50,769	27
1950.....	630,102	694	437,506	1,237,548	1,675,054	26	74	51,976	32
1951.....	652,453	816	532,351	1,392,498	1,924,849	28	72	53,212	36
1952.....	724,875	584	423,646	1,264,240	1,687,886	25	75	54,477	31
1953.....	809,579	852	689,500	1,657,491	2,346,991	29	71	55,772	42
1954.....	910,414	848	771,692	1,644,193	2,415,885	32	68	57,098	42
1955.....	1,081,397	806	871,333	1,853,472	2,724,805	32	68	58,456	47
1956.....	1,196,063	921	1,101,315	1,496,360	2,597,675	42	58	59,846	43
1957.....	885,573	965	854,971	1,475,012	2,329,983	37	63	61,268	38
1958.....	1,153,517	677	781,143	1,453,469	2,234,612	35	65	62,725	36
1959.....	1,291,454	348	450,000	1,803,000	2,253,000	20	80	64,216	35

<sup>1</sup> For crops harvested in the months of November-December of years immediately preceding those indicated. Compiled from Anuario Estatística do Brasil except as otherwise indicated.

<sup>2</sup> Imports include wheat and flour in terms of wheat. Compiled from Comercio Exterior do Brasil except for 1958 and 1959. The latter are estimates of the American Embassy, Rio de Janeiro.

<sup>3</sup> Excludes stocks which are believed to have been negligible but for which figures are not available.

<sup>4</sup> Ministry of Agriculture's first estimate placed the crop at 1,154,514 tons. This estimate was subsequently reduced because of damage by bad weather and disease.

TABLE 8.--Wheat and flour (grain equivalent): Brazil's imports by country of origin, 1920-58

Year	Argentina	Uruguay	United States	Canada	Other	Total
	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>
1920.....	10,766	142	4,955	--	16	15,879
1921.....	13,653	336	3,103	132	6	17,230
1922.....	19,617	226	2,223	47	1	22,114
1923.....	20,413	74	2,178	158	4	22,827
1924.....	23,168	2,005	3,047	372	--	28,592
1925.....	22,679	960	3,220	587	6	27,452
1926.....	18,649	688	8,820	2,952	34	31,143
1927.....	26,188	1,292	4,668	8	60	32,216
1928.....	30,422	1,732	3,870	94	20	36,138
1929.....	30,957	1,122	3,562	--	21	35,662
1930.....	24,756	1,364	4,796	247	363	31,526
1931.....	26,164	21	6,148	1	13	32,347
1932.....	10,036	1	18,594	--	2	28,633
1933.....	30,303	216	2,951	218	6	33,694
1934.....	32,827	799	834	234	56	34,750
1935.....	34,114	193	355	5	32	34,699
1936.....	35,063	929	327	37	15	36,371
1937.....	35,001	227	1,034	30	--	36,292
1938.....	39,283	803	184	15	--	40,285
1939.....	36,302	684	238	9	--	37,233
1940.....	31,748	140	450	4	94	32,436
1941.....	33,164	--	627	--	--	33,791
1942.....	35,129	36	375	--	--	35,539
1943.....	38,596	661	346	--	--	39,603
1944.....	46,184	565	1,065	--	--	47,814
1945.....	43,356	--	3,799	18	62	47,235
1946.....	6,828	--	12,209	840	263	20,140
1947.....	13,986	--	21,933	535	429	36,883
1948.....	12,011	1,545	17,682	169	452	31,859
1949.....	27,085	5,425	3,693	59	--	36,262
1950.....	35,233	109	4,271	734	5,125	45,472
1951.....	33,990	2,425	11,805	2,944	--	51,164
1952.....	1,662	5,549	34,858	4,383	--	46,452
1953.....	41,069	1,158	9,430	7,595	1,650	60,902
1954.....	27,979	9,654	5,238	7,705	9,837	60,413
1955.....	50,282	9,333	5,871	--	2,617	68,103
1956.....	23,876	10,889	20,217	--	--	54,982
1957.....	31,608	3,892	18,698	--	--	54,198
1958 <sup>1</sup> .....	32,187	3,307	17,911	--	--	53,405

<sup>1</sup> Estimate of Agricultural Attache, American Embassy, Rio de Janeiro.

Estatística do Comercio Exterior, Serviço de Estatística Economica e Financeira, Ministerio da Fazenda.

States 23 percent, Uruguay 10 percent, and Canada 7 percent. During the next 3 years, Argentina again supplied 54 percent of the average imports but the U.S. share increased to 35 percent and the Uruguayan to 11 percent.

Imports from other countries as a rule have been insignificant. The only notable exceptions were in 1950 when some wheat was imported from France under a barter agreement (French wheat in exchange for Brazilian coffee, cocoa, fruit, mate, and pine lumber); in 1953 and 1954 when some was imported from Sweden; and in 1954 and 1955 when substantial quantities were imported from Turkey and Finland, the latter consisting of Russian wheat reexported by Finland.

While the trend in imports has been upward, frequent contractions have taken place from time to time during the past 30 years. The principal reasons were occasional poor harvests in

Argentina, the chief supplier; the impact of the world economic crisis on Brazil's capacity to import; balance of payments difficulties; and increases in world wheat prices in the late forties, when Argentina channeled more of its exports to other markets.

### Trade Agreements

For many years Brazil has found it advantageous to assure availability of needed imports from such nearby sources of supply as Argentina and Uruguay by means of special trade agreements thus reducing the drain on dollar exchange. In addition, substantial imports have been obtained in recent years from the United States under long-term credit arrangements and against payment in cruzeiros. On a few occasions, agreements were also in effect for wheat from France and Finland. Brazil is a member of the International Wheat Agreement. However, from July 1, 1956, until April 1959, no imports were made under that Agreement.

Under the trade agreement with Argentina, signed in Rio de Janeiro on July 30, 1957, Brazil agreed to purchase 1 million metric tons (36.7 million bushels) of wheat annually during the 3 years ending with 1960. An earlier agreement, signed on January 20, 1955, provided for the purchase of 1.2 million tons (44.1 million bushels) annually for a 3-year period ending with 1957. However, Argentina found it impossible to supply that much wheat.

The record shows that Brazilian imports from Argentina reached as much as 1 million tons only 6 times during the past 25 years, ranging in that period from a low point of 45,000 tons (1.7 million bushels) in 1952 to a peak of 1,368,000 tons (50.3 million bushels) in 1955. The reasons were short-falls in Argentine export availabilities, desire of Argentina to hold and expand its markets in hard currency countries where it could acquire needed capital goods, and failure to reach agreements with Brazil with respect to prices Brazil would have to pay for the wheat and prices Argentina would have to pay for Brazilian coffee and other products.

Under the new agreement signed in July 1957, Brazil is obliged to purchase at the 1-million-ton level only during years when the Argentine exportable surplus exceeds 3 million tons. In years when it is less, Brazil is assured that Argentina will maintain shipments as close as possible to the 1-million-ton level and that it will see to it that not less than 30 percent of whatever surplus it does have in such years will be allocated to Brazil.

The agreement contains provisions to protect the interests of the Brazilian wheat grower and the government's commitments to other foreign suppliers. In that connection, Brazil may reduce its annual purchase below the 1-million-ton level whenever its wheat crop reaches a point where it would be impossible for the country to absorb that much Argentine wheat in addition to quantities it is obligated to purchase under agreements with other competing countries.

It also provides, however, that if domestic production plus supplies provided for in agreements with Argentina and other competing countries are not sufficient to cover Brazilian requirements during any of the 3 years, Argentina will be given priority in supplying any additional quantities needed. Accordingly, Brazil recently signed a contract for the purchase of 1.2 million tons of Argentine wheat in 1959 with an option to purchase an additional 300,000 tons if needed.

Brazil's several trade agreements with Uruguay during the past decade provided for purchases of from 250,000 to 350,000 tons (grain equivalent) of wheat and flour annually. The agreements, as a rule, covered a 3-year period but actual quantities and prices were subject to annual negotiations. In the current agreement, signed on July 23, 1958, Uruguay was to supply 250,000 tons of wheat and 40,000 tons of flour annually during the 3 years ending with 1960, subject to satisfactory arrangements each year relative to prices and deliveries. However, it has not been able to provide that much wheat because of poor crops.

Partly because of increasing demand for wheat and uncertainty of supplies from Argentina and Uruguay and partly because of a shortage of dollar exchange, Brazil negotiated a Public Law 480 agreement for wheat from the United States. During the 3-year period ending with the 1957-58 (July-June) marketing season, more than 82 percent of the U.S. wheat and flour exported to Brazil was sold under Title I of that law for payment in cruzeiros. Such purchases otherwise could not have been made. The cruzeiros are in large part reloaned to Brazil for economic development. This arrangement enabled Brazil to assure needed supplies of imported wheat and flour despite a crisis in its foreign exchange earnings.



TABLE 9.--Wheat and flour: U. S. exports to Brazil under various government programs and cash sales, 1954-55 through 1957-58

Programs	1954-55	1955-56	1956-57	1957-58
	1,000 metric tons <sup>1</sup>	1,000 metric tons <sup>1</sup>	1,000 metric tons <sup>1</sup>	1,000 metric tons <sup>1</sup>
Public Law 480:				
Title I.....	--	432.7	368.8	155.7
Title II.....	--	--	--	--
Barter.....	--	--	9.6	--
Section 402.....	--	--	--	--
Section 416.....	--	--	0.6	--
Total.....	--	432.7	379.0	155.7
Cash sales <sup>2</sup> .....	242.7	49.9	--	144.2
Grand total.....	242.7	482.6	379.0	299.9

<sup>1</sup> Grain equivalent. A metric ton (2,204.6 lbs.) = 36.743 bushels of 60 pounds each.

<sup>2</sup> Cash sales are a residual, i.e., total exports as reported by the Bureau of the Census less shipments made under various programs.

Exports under programs obtained from agencies responsible for their administration and total exports from records of the Bureau of the Census.

### Flour and Wheat

Over the years, Brazil's requirements of imported wheat and flour have been met largely by importing wheat for grinding in local mills. Back in 1916-20, approximately 40 percent of the country's wheat and flour imports were in the form of flour, but with increasing domestic production of wheat and expansion in local milling facilities, flour imports declined greatly, especially from Argentina. In recent years, no more than 3 to 5 percent of the imports have been in the form of flour, most of it coming from the United States and Uruguay. Most of the mills are located in the eastern and southern States, in or close to the areas where wheat is grown. Requirements of northeastern and northern Brazil, where little or no wheat is grown, are met either by shipping wheat and flour from southern Brazil or by imports.

TABLE 10.--Wheat: Brazilian imports by source, averages 1911-55, annual 1956-58

Year	Argentina	Uruguay	Canada	United States	Other	Total
	Metric tons <sup>1</sup>	Metric tons <sup>1</sup>	Metric tons <sup>1</sup>	Metric tons <sup>1</sup>	Metric tons <sup>1</sup>	Metric tons <sup>1</sup>
Average:						
1911-15.....	351,122.4	2,018.8	1,930.8	22,396.8	3,710.8	381,179.6
1916-20.....	281,026.2	4,205.4	981.6	11,660.4	3,451.4	301,325.0
1921-25.....	448,095.6	8,343.0	4,196.0	11,682.4	5.0	472,322.0
1926-30.....	593,382.6	12,533.6	13,256.4	24,530.0	1,905.4	645,608.0
1931-35.....	681,454.8	1,020.2	2,459.2	136,841.6	202.8	821,978.6
1936-40.....	935,381.8	1,675.4	--	4,863.4	601.4	942,522.0
1941-45.....	1,032,232.2	2,047.8	--	277.6	340.8	1,034,898.4
1946-50.....	504,831.2	13,559.6	4,023.4	30,753.2	31,665.0	584,832.4
1951-55.....	813,173.2	60,961.0	107,086.0	355,951.4	92,852.6	1,430,024.2
Annual:						
1956.....	627,471.0	268,421.0	--	526,564.0	--	1,422,456.0
1957.....	860,218.0	90,511.0	--	489,903.0	--	1,440,632.0
1958 <sup>2</sup> .....	876,000.0	90,000.0	--	450,000.0	--	1,416,000.0

<sup>1</sup> 1 metric ton (2,204.6 pounds) of wheat = 36.743 bushels.

<sup>2</sup> Preliminary and subject to revision.

Comercio Exterior do Brasil, Diretoria de Estatística Economica E Financeira, Ministerio da Fazenda.

TABLE 11.--Wheat flour: Brazilian imports by source, averages 1911-55, annual 1956-58

Year	Argentina	Uruguay	Canada	United States	Other	Total
Average:	<i>Metric tons</i> <sup>1</sup>	<i>Metric tons</i> <sup>1</sup>	<i>Metric tons</i> <sup>1</sup>	<i>Metric tons</i> <sup>1</sup>	<i>Metric tons</i> <sup>1</sup>	<i>Metric tons</i> <sup>1</sup>
1911-15.....	85,907.0	8,623.6	15.6	59,561.8	2,087.2	156,195.2
1916-20.....	97,398.6	13,562.8	--	28,891.8	713.4	140,566.6
1921-25.....	67,992.2	8,173.4	2,072.6	45,934.6	65.0	124,237.8
1926-30.....	86,765.8	15,388.6	3,418.2	83,799.8	595.0	189,967.4
1931-35.....	32,606.6	4,117.6	23.0	14,787.0	274.6	51,808.8
1936-40.....	21,927.4	9,779.6	376.4	5,287.8	2.6	37,373.8
1941-45.....	26,819.0	3,504.2	69.6	24,345.8	--	54,738.6
1946-50.....	9,471.0	18,129.4	6,307.4	213,914.2	1,788.8	249,610.8
1951-55.....	22,084.2	66,855.2	--	7,139.4	1.2	96,080.0
Annual:						
1956.....	16,201.0	20,277.0	--	17,171.0	--	53,649.0
1957.....	--	11,185.0	--	13,772.0	--	24,957.0
1958 <sup>2</sup> .....	--	--	--	27,200.0	--	27,200.0

<sup>1</sup> A metric ton (2,204.6 pounds) of flour as flour.

<sup>2</sup> Preliminary and subject to revision.

Comercio Exterior do Brasil, Diretoria de Estatística Economica e Financeira, Ministerio da Fazenda.

TABLE 12.--Wheat flour: Brazilian imports by source, averages 1911-55, annual 1956-58

Year	Argentina	Uruguay	Canada	United States	Other	Total
Average:	<i>Metric tons</i> <sup>1</sup>	<i>Metric tons</i> <sup>1</sup>	<i>Metric tons</i> <sup>1</sup>	<i>Metric tons</i> <sup>1</sup>	<i>Metric tons</i> <sup>1</sup>	<i>Metric tons</i> <sup>1</sup>
1911-15.....	118,341.2	11,879.4	21.5	82,049.4	2,875.2	215,166.7
1916-20.....	134,171.6	18,683.4	--	39,799.9	982.7	193,637.6
1921-25.....	93,662.6	11,259.2	2,855.1	63,277.2	89.5	171,143.6
1926-30.....	119,524.2	21,198.6	4,708.7	115,438.4	819.6	261,689.5
1931-35.....	44,917.2	5,672.2	31.7	20,369.8	378.3	71,369.2
1936-40.....	30,206.0	13,471.9	518.5	7,284.2	3.6	51,484.2
1941-45.....	36,944.5	4,827.2	95.8	33,537.6	--	75,405.1
1946-50.....	13,046.7	24,974.2	8,688.8	294,677.5	2,464.2	343,851.4
1951-55.....	30,422.1	92,096.4	--	9,834.9	1.6	132,355.0
Annual:						
1956.....	22,317.0	27,933.0	--	23,654.0	--	73,904.0
1957.....	--	15,408.0	--	18,972.0	--	34,380.0
1958 <sup>2</sup> .....	--	--	--	37,469.0	--	37,469.0

<sup>1</sup> Converted to grain equivalent on basis of 1.37755 metric tons of wheat = 1 ton of flour.

<sup>2</sup> Preliminary and subject to revision.

Comercio Exterior do Brasil, Diretoria de Estatística Economica e Financeira, Ministerio da Fazenda.

### Foreign Exchange Problem

Well over half of Brazil's foreign exchange earnings are obtained from coffee exports. Exports of cacao and cacao products and vegetable fibers, mainly cotton, rank next in importance and are followed by sugar, lumber, iron ore, oleaginous raw materials and products, tropical and semitropical fruits, tobacco, hides and skins, and mate. Up until the midforties, the use of foreign exchange to finance imports of wheat and flour was greater than for any other single commodity. Since then, wheat and flour have yielded first place to petroleum products, the need for which has been increasing rapidly as a result of the development of motorized transport.

TABLE 13.--Wheat and flour: Brazilian imports by source, averages 1911-55, annual 1956-58

Year	Argentina	Uruguay	Canada	United States	Other	Total
Average:	<i>Metric tons</i> <sup>1</sup>	<i>Metric tons</i> <sup>1</sup>	<i>Metric tons</i> <sup>1</sup>	<i>Metric tons</i> <sup>1</sup>	<i>Metric tons</i> <sup>1</sup>	<i>Metric tons</i> <sup>1</sup>
1911-15.....	469,463.6	13,898.0	1,952.4	104,446.2	6,586.2	596,346.4
1916-20.....	415,197.8	22,888.8	981.6	51,460.4	4,434.0	494,962.6
1921-25.....	541,758.2	19,602.2	7,051.1	74,959.6	94.6	643,465.6
1926-30.....	712,906.6	33,732.0	17,965.2	139,968.4	2,725.4	907,297.6
1931-35.....	726,372.0	6,692.6	2,491.0	157,211.2	580.8	893,347.6
1936-40.....	965,587.8	15,147.4	518.4	12,147.8	604.8	994,006.2
1941-45.....	1,069,176.8	6,875.0	95.8	33,815.4	340.8	1,110,103.8
1946-50.....	517,878.2	38,534.0	12,712.2	325,430.6	34,129.0	928,684.0
1951-55.....	843,595.3	153,057.4	107,086.0	365,786.3	92,854.2	1,562,379.2
Annual:						
1956.....	649,788.0	296,354.0	--	550,218.0	--	1,496,360.0
1957.....	860,218.0	105,919.0	--	508,875.0	--	1,475,012.0
1958 <sup>2</sup> .....	876,000.0	90,000.0	--	487,469.0	--	1,453,469.0

<sup>1</sup> Wheat imports plus grain equivalent of flour imports, the latter obtained by multiplying metric tons of flour by 1.37755 (see table No. 12).

<sup>2</sup> Preliminary and subject to revision.

Comercio Exterior do Brasil, Diretoria de Estatística Economica e Financeira, Ministerio da Fazenda.

The increasing demand for wheat and progressively heavier imports needed to meet requirements considerably disturbed the country's international balance of payments. In its present stage of active industrial development, Brazil feels it needs all of the convertible foreign exchange it can get, especially dollars, for the purchase of capital goods, raw materials, and consumer goods it cannot produce at home. This was one of the principal factors in the government's decision to expand domestic production.

Wheat and flour imports constitute a little more than 6 percent of the value of the country's imports of all commodities compared with 13 percent in the 1920's and 1930's. Also, the value of the country's imports of wheat and flour is equivalent to a little more than 9 percent of the value of its exports of all commodities. This compares with about 11 percent in the earlier period.

TABLE 14.--Relation of values of Brazilian wheat imports to values of imports and exports of all commodities, averages 1921-57, annual 1955-57

Period	Value of wheat imports			Values of all commodities		Ratio of wheat imports to	
	Wheat	Flour	Total	Imports	Exports	Total imports	Total exports
Average:	<i>1,000 cruzeiros</i>	<i>1,000 cruzeiros</i>	<i>1,000 cruzeiros</i>	<i>1,000 cruzeiros</i>	<i>1,000 cruzeiros</i>	<i>Percent</i>	<i>Percent</i>
1921-30.....	256,791	107,452	364,243	2,732,117	3,279,714	13.3	11.1
1931-40.....	413,116	30,923	444,039	3,666,060	4,197,866	12.1	10.6
1941-50.....	1,073,042	412,760	1,485,802	13,108,901	15,205,018	11.3	9.8
1951-57.....	3,389,678	302,461	3,692,139	53,291,632	44,035,228	6.9	8.4
Annual:							
1955.....	3,667,643	455,469	7,815,251	60,225,657	54,521,072	12.9	14.3
1956.....	3,316,302	229,469	3,545,771	71,596,808	59,474,292	4.9	6.0
1957.....	5,387,346	177,438	5,564,784	86,451,541	60,657,129	6.4	9.2

Anuario Estatístico do Brasil, 1958.



Consumption of wheat products in the past has frequently been limited by shortages of dollars with which to finance needed imports. Currently, depressed coffee prices are exerting an unfavorable impact on all imports, including wheat; but beginning with 1956-57, sales of U.S. wheat to Brazil under Public Law 480 have helped to bridge the gap between export availabilities from other sources and the expanding demand for bread and other wheat products.

## Outlook

With continued population growth, industrial expansion and further improvements in per capita incomes and dietary standards, wheat consumption is expected to increase much more rapidly than production. The country, therefore, will continue to depend on imports for a major part of its requirements. The principal factors determining actual import levels in the future will be domestic production, export availabilities in Argentina and Uruguay, Brazil's foreign exchange earnings, especially of dollars, and possibilities for importing under such programs as Public Law 480. Even if production were to reach as high as 1.5 million tons by 1970, which, at present appears unlikely, it still would represent no more than 38 percent of the anticipated needs of 4.0 million tons.

## Problems

The success of the Wheat Expansion Service in bringing about more than a sevenfold increase in the country's wheat production in less than two decades despite problems that had to be overcome, ranks as one of the most outstanding accomplishments in the history of Brazilian agriculture. Even so, much still remains to be done if the gains are to be solidified or if production is to be increased to a point where the level of dependence on imports can be substantially reduced.

## Production Costs

Production costs in Brazil are on the high side. Much of the land now under wheat would revert to grass in the absence of a price support, or if beef prices increased sufficiently to make livestock production more competitive for use of the land. Further expansion in production will depend not only on maintenance of a high incentive price, which in turn depends on the ability of the government to keep costs of the Wheat Expansion Service within limits it is willing and able to pay, but also on reducing production costs.

Wide variations in prices of production requisites make it virtually impossible to calculate a cost figure representative of the entire wheat producing area of Brazil. Price differences are mainly the result of varying distances from farms to supplying centers, differences in available transportation and costs, and differences in production methods, the latter ranging from farms where all of the work is done by hand labor to those where all operations are mechanized.

An attempt was made by local experts in 1957 to arrive at an approximate cost figure on a rented farm of 140 hectares (346 acres) in the State of Rio Grande do Sul. The farm was in its second year of cultivation and the system of culture practiced was one that is most common in the State. The results of the survey, as submitted to the Ministry of Agriculture, appear in table 16.

The study indicates that the wheat--2,800 sacks of 60 kilos each--produced on this farm cost Cr\$1,209,629<sup>3</sup>. This amounts to Cr\$8,640.20 per hectare and Cr\$432.01 per sack based on a yield of 20 sacks of 60 kilos per hectare.

The cost of production for 1956 was reported to have been Cr\$384.00 per sack. On the basis of an average increase of 12.52 percent in costs of labor, rent, and production factors over 1956, the break-even point in 1957 on cost of production should be Cr\$432.07.

<sup>3</sup>Because of the multiple exchange system in operation in Brazil, any conversion of cost figures from cruzeiros to dollar equivalents has little significance. Among others, the following exchange rates were in effect at indicated periods:

	Dec. 31 1956	Dec. 31 1957	Dec. 31 1958	Feb. 28 1959
	<u>Cruzeiros to the dollar</u>			
Free exchange rate.....	66	91	139	140
Rate applicable to wheat from the U.S.....	67	67	92	100
Rate for farm machinery imports.....	86	86	211	311
Rate for coffee exports.....	37	37	37	60

TABLE 15.--Wheat: Unit price and percentage variations in price of production needs, 1956 and 1957

Factors	Unit	Costs		Difference
		1956	1957	
Fuel and lubricants:		<i>Cruzeiros</i>	<i>Cruzeiros</i>	<i>Percent</i>
Diesel oil.....	Liter.....	2.53	4.72	86.5
Kerosene.....	Liter.....	4.03	6.05	50.1
Gasoline.....	Liter.....	5.97	7.53	25.1
Lubricating oil.....	Kilo.....	27.57	42.36	53.8
Grease.....	Kilo.....	26.22	39.83	52.0
Fertilizers <sup>1</sup> .....	.....	100.00	110.30	10.3
Limestone.....	Ton.....	900.00	1,201.00	33.4
Sacking.....	Each.....	22.80	26.50	11.8
Rent <sup>2</sup> .....	Hectare...	756.00	1,012.00	33.7
Machinery:				
Tractor.....	50 Hp.....	475,000.00	403,000.00	-16.7
Implements <sup>1</sup> .....	.....	100.00	95.50	-4.5
Combine, S.P.....	12 ft.....	700,000.00	642,000.00	-8.3
<u>Labor</u>				
Tractor operation.....	Month.....	2,811.00	3,832.00	36.0
Common laborer.....	Month.....	2,235.00	3,017.00	34.9

<sup>1</sup> Because of the variation in types of fertilizers and equipment an index figure of 100 was used for 1956 instead of actual prices.

<sup>2</sup> Rent on cultivated area. For purposes of calculating rent it was assumed that 70 percent of the rented area was usable.

Other individual wheat cost studies submitted to the Minister of Agriculture in 1957 indicated costs in different municipalities varying from Cr\$400 to Cr\$450 per bag.

### Storage and Transportation Facilities

One of the most serious problems associated with implementation of Brazil's wheat expansion program is that relating to transportation and storage. Both are inadequate, neither having been expanded as rapidly as production. The extent to which the government and private enterprise can bring about improvements will be an important factor in any further expansion in production.

Limited railroad freight capacity forces growers to lay in such production requisites as fuel, seed, fertilizers, and bags, far in advance of the time needed, thus adding to interest costs on borrowed operating capital. It also necessitates long periods of waiting before wheat can be moved to market. Railroad transportation has been improved somewhat in recent years by addition of a number of diesel locomotives. However, shortage of box cars makes it necessary to move much of the wheat in bags instead of in bulk, thus adding to costs. Ships for coastal movement of grain also are limited.

Even if sufficient transportation were available, municipal and mill storage facilities could accommodate only a small part of the crop. As a result, much of it must be held on the farm until space is available. Inadequate and, in many instances, complete lack of farm storage facilities constitutes an especially serious problem. Much of the harvested wheat is damaged by moisture, insects, and rodents. The grain is seldom thoroughly dried. Much of it may be held for a good part of a year without being turned over or fumigated. The wheat is cleaned before it is shipped. Weevils and dirt are sacked for poultry feed.

For want of farm and terminal storage facilities, farmers in more remote producing areas frequently find it necessary to sell at less than the fixed minimum in order to meet financial obligations and avoid losses. In addition, lack of an adequate storage has impeded the development of a credit system based on warehouse receipts which would ease the pressure on farmers to sell most of their wheat at harvesttime instead of holding for better prices later.

TABLE 16.--Wheat: Detailed production costs on a 140-hectare farm, 1957

Factors	Cost
Rent <sup>1</sup> :	Cruzeiros
140 hectares at Cr\$737.20 per hectare.....	103,210
Cost of production:	
Fertilizer, 10-30-10, 200 kilos per hectare at Cr\$7,050 per ton.....	197,400
Freight on 28 tons of fertilizer.....	6,999
Seed, 256.6 sacks at Cr\$535	
Seeded at rate of 110 kilos per hectare.....	137,281
Freight on seed.....	3,849
Insecticides and application.....	14,000
Fuel and lubricants:	
Plowing Cr\$156 per hectare.....	21,840
Discing.....	14,560
Planting.....	7,280
Harvesting.....	9,408
Sacking 2,800 sacks at Cr\$27.....	75,600
Twine 34.4 kg. at Cr\$30 per kilo.....	1,032
Transport of grain, field to farm storage.....	3,500
Transport to shipping point.....	42,000
General costs:	
Taxes, sales tax of 4.74% calculated on price of Cr\$400 per sack.....	53,088
Insurance against fire.....	4,000
Maintenance and conservation:	
Improvements - 6% of Cr\$140,000.....	8,400
Machinery - 10% of Cr\$1,290,000.....	129,000
Salaries:	
Administrator - 12 months at Cr\$5,000.....	60,000
2 tractor operators at Cr\$3,100 & Cr\$4,000 for 12 months.....	85,200
4 additional employees Cr\$100 for 30 days.....	12,000
Amortization <sup>2</sup> :	
Machinery, implements and tools.....	144,600
Improvements <sup>3</sup> .....	14,000
Interest:	
Bank financing <sup>4</sup> .....	45,274
Operator's capital <sup>5</sup> .....	16,108
Total cost.....	1,209,629

<sup>1</sup> 140 hectares at Cr\$516.05 but with only 70 percent of the total area usable, or an effective cost of Cr\$737.21 per hectare.

<sup>2</sup> Amortization calculated on the basis of a life of 5 years, having at this time a residual value of 30 percent; 10 years for the self-propelled combine with a residual value of 20 percent; and the improvements, a life of 10 years. The value of implements was calculated as follows:

	Cruzeiros
1 50 HP tractor	400,000
1 Plow of 5 discs	100,000
1 Disc of 40/48 discs	50,000
1 Drill of 17 rows	80,000
1 Trailer	50,000
1 Self-propelled combine	600,000
Tools	10,000
Total	1,290,000

<sup>3</sup> Improvements consisting of one storage shed worth Cr\$80,000 and two worker's houses worth Cr\$60,000.

<sup>4</sup> Bank of Brazil loans are made in three parcels. The first and second, amounting to 80 percent of the total, are generally available at the same time, in March-May, and the third in October. The Bank finances about 60 percent of the value of production calculated on a conservative yield of 15 sacks per hectare at an interest rate equal to 7 percent plus 1 percent of commission plus other banking stamps, etc., making a total interest of about 10 percent. In this study it was calculated that the interest on the first and second loans was Cr\$40,654, and on the third Cr\$4,620, with repayment in February.

<sup>5</sup> Operator's capital includes that part of expenses not covered by a Cr\$554,400 bank loan and leaving out expenses that do not require outlay, such as sales tax, interest, amortization, and administration. This left Cr\$322,159 to be covered by operator's capital on which interest is calculated at 10 percent for 6 months.



TABLE 17.--Wheat: Proportional use of various factors used in calculating the cost of production, 1957

Factors	Cost for 140 hectares	Share of total
	<i>Cruzeiros</i>	<i>Percent</i>
Fertilizer.....	197,400	16.3
Amortization.....	158,600	13.1
Salaries.....	157,200	13.0
Maintenance.....	137,400	11.4
Seed wheat.....	137,281	11.3
Taxes and interest.....	118,470	9.8
Rent.....	103,210	8.5
Sacking.....	76,632	6.3
Transportation.....	56,348	4.7
Fuel and lubricants.....	53,088	4.4
Insecticides.....	14,000	1.2
Total.....	1,209,629	100.0

### Mechanization

Although there are still many farms, especially in zona colonial districts, where the work is done almost entirely by hand labor, mechanization has taken place rapidly in zona de campo districts where most of the crop is grown. Mechanization in the latter areas has been promoted by the high price support for wheat and by government action to facilitate imports of farm machinery and spare parts that cannot be produced locally.

The need for importing mechanical equipment will not be a limiting factor to further expansion in wheat production provided credit is available to finance purchases and wheat prices remain at a satisfactory level. Brazilian wheat growers prefer large self-propelled combines. In almost all cases, wheat is sacked in the field. There is little custom combining or exchange of equipment and labor among wheat growers. Disc plows are predominately used for land preparation, and the outstanding preference in power is for diesel tractors.

Lack of sufficient spare parts constitutes a problem of considerable importance. Repair stations have not been established as rapidly as mechanization has taken place. Many growers have had to overmechanize in order to have sufficient machinery in working condition to get the work done. Lack of trained personnel to operate and service the machinery is also a problem, for it cuts down on the useful life of mechanical equipment. Machine operating costs are high not only because of the high original price of mechanical equipment but also because spare parts and repairs are expensive.

### Fertilizer Supplies

Fertilizer supplies are far from adequate, and farmers generally lack experience and knowledge with respect to their best use. Only small quantities of green manure are used. It is believed that fully 50 percent of the country's wheat crop is grown without any fertilizer at all. This is an important factor in the low yields. Several official soil testing stations have been established by the government, and farmers are being encouraged to submit soil samples in order to obtain expert advice on necessary soil treatment.

Most of the natural grassland, where the bulk of the wheat crop is grown, has been burned over for many years. As a result, it is low in humus and tends to be acid. A few farmers in Rio Grande do Sul use limestone, but supplies are not readily available. Preliminary tests at experiment stations indicate that applications of lime for neutralization of acidity should be at the rate of 1,500 kilograms per hectare in three annual installments.

Late in 1957, fertilizer prices ranged from Cr\$5,000 to Cr\$7,000 per metric ton in the interior for mixtures varying from 30 to 50 percent active ingredients. Available mixtures generally contain larger proportions of phosphorus and smaller amounts of nitrogen and potassium. Where used, applications vary from 330 to 880 pounds per hectare (2,471 acres).

Official recommendations with regard to soil treatment include the following: (1) sending soil samples to testing laboratories in order to obtain advice with respect to necessary treatment; (2) intensified use of ground limestone in accordance with instructions from the laboratories; (3) intensified use of phosphoric fertilizers at the rate of 60 kilos of  $P_2O_5$  per hectare; and (4) use in the State of Rio Grande do Sul of nitrogen fertilizers (saltpeter and ammonium sulphate) at the rate of 50 kilograms per hectare - experiments thus far in other producing States show no need for potassium fertilizers. Farmers have been advised to use them only on recommendation of soil testing laboratories.

#### Diseases and Insect Pests

Little is known about the prevalence of wheat diseases and insect pests in Brazil. Those mentioned as causing damage to the crop from time to time are mainly Septoria nodorum, a blight that attacks the leaves, culms, and heads, and S. tritici, a blight that attacks mainly the leaves; Tilletia caries and T. foetida, bunt or smuts; largarta (Cirphus unipuncta), a caterpillar similar to the army worm; and occasionally grasshoppers near the Argentine border.

Control measures recommended by the Wheat Expansion Service for Septoria nodorum and S. tritici are crop rotation, plowing under of old straw, and use of resistant varieties. For control of Tilletia caries and T. foetida, the agency recommends use of smut resistant varieties properly treated with an appropriate fungicide, and seeding of such seed when soil and temperature conditions are unfavorable to bunt development. Insect pests apparently are fairly well controlled by use of appropriate sprays.

Apparently, diseases and insect pests have not been a serious problem in the development of the country's wheat industry to date. However, they have taken a heavy toll sporadically. That was especially the case for the crop harvested in November-December 1958. Included among the diseases reported in the Brazilian press as having seriously damaged the 1958 crop were the following: Wheat smut, which turned the kernels into a black powder and left the axis bare; "Helminthosporium," which caused lower stem rot, brown spots on the leaves, and darkening of the joint and the kernel; "Septoriosis," which covered the surface of the leaves with black spots and killed the plant; lower stem rot; stem and leaf rust; and "Sintractia," described only as a parasite.



Iwar Beckman, Brazil's famous wheat breeder, photographed with one of the several commercial varieties he has produced for the country. Most Brazilian wheat is the medium-hard spring type. Yields are still low, but several good varieties are now available with higher yields, better standability, and rust resistance.

#### Varieties and Yields

Wheat yields in Brazil are relatively low. Using official area and production figures for the 5 years ending with the 1954 crop, it appears that yields averaged only 11.7 bushels per acre. During the same period, they averaged 18.2 bushels in Argentina, 14.8 bushels in Uruguay, 20.6 bushels in Canada, 17.3 bushels in the United States, and 17.0 bushels in Australia. Yields undoubtedly can be increased with development and use of higher-yielding varieties, greater use of fertilizers, adoption of appropriate crop rotations, and attention to soil erosion.

Several good varieties have been bred by Brazilian geneticists for sowing in Brazil. Breeding thus far has been largely on the basis of selecting for higher yields, standability, and resistance to rust. Little or no work has been done as yet on the development of varieties for milling quality. Most of the Brazilian crop is a medium-hard spring type. Only the Bage variety is said to be a hard wheat. Production of the latter is limited to the extreme southern part of the wheat growing area.

The following varieties have been recommended for indicated producing States: In Rio Grande do Sul - Colonias, Frontana, and Trintani in any part of the State, and Bage in the plains and southeast mountain area; in Santa Catarina - Trinticino, Frontana, Rio Negro, Petiblanco, and Colonias; in Paraná - Trinticino, P.G. 1, Frontana, Colonias, Alegreta, and Trintani in the southern part of the State, and Bandeirantes and Frontana in the northern part; in São Paulo - Frontana, IAS1, Konia 155, and Bandeirantes; in Minas Gerais - Konia 155, Frontana, and BH 1146; and in Goiás - Bandeirantes, Frontana, Florcana, and Konia 155.

### Erosion

Erosion has become a serious factor where continuous wheat cropping is practiced. It has taken an especially severe toll in the older wheat areas. Even in the northern "planalto" area of Rio Grande do Sul and in some of the newer producing areas, where some of the plantings are on contoured land, erosion is a constant threat. Consideration is being given to cover cropping for green manure. Farmers who have interplanted legumes or have followed wheat with cowpeas have obtained excellent results.

### Soil Conservation and Crop Rotation

There is an urgent need for adoption of soil conservation and scientific crop rotations throughout the wheat producing area. Such practices are virtually unknown in the zona colonial, and little progress has been made along those lines in the zona de campo. Even in the latter districts, such practices as have been adopted are inadequate, being confined to contour farming. Owing to the slope of the land and heavy rainfall, this procedure alone affords little soil protection.

Adoption of scientific crop rotations is important not only to the future of the country's wheat industry but also of its livestock industry. Much of the wheat land in the zona de campo is planted to wheat year after year. The Wheat Expansion Service is urging diversification, not only to promote soil conservation but also with a view to counteracting a tendency toward eliminating livestock husbandry in favor of a one-crop economy.

The recommended rotation<sup>1</sup> includes alternating the sowing of wheat for two consecutive years with one year of other annual crops--corn, oats, barley, beans, soybeans, and linseed, depending on soil and climatic conditions and availability of labor and machinery--and 3 years of perennial fodder crops. Of the area under fodder crops, only one-third would be sown each year.

### Competition for Use of Land

Most of the expansion in Brazilian wheat production has been on lands which formerly were used almost exclusively for livestock grazing. While lands of this type are not limitless there is little doubt but that sufficient areas are available to permit further increases in wheat production. However, further use of such land for wheat alone would have to be at the expense of the livestock industry.

These areas enjoy many advantages for livestock enterprises. They are excellent pasture lands with a bountiful water supply. Besides, they produce abundant corn and root crops for livestock feeding. In addition, they are close to large local markets for livestock products and near ports from which such products can be shipped to world markets. As a result, they contain large dairy and packinghouse industries.

Rio Grande do Sul, the leading wheat producing State, is also the country's principal pastoral State. As such, it is responsible for the bulk of Brazil's exports of chilled and corned beef. Cattle interests there are reluctant to break up pasture lands for wheat because wheat growing requires

<sup>1</sup>Economic Bulletin for Latin America, Vol. II, No. 1, published by the Secretariat of the Economic Commission for Latin America, United Nations, February, 1957.



more time and capital even though profits under the existing price support may currently be higher.

The fact that most of the increase in production has been on land rented by so-called "suitcase farmers" attracted by prospects of profits under the government's wheat price support neither contributes to a stabilized wheat industry nor to the adoption of needed soil conservation, fertilization, and conservation practices. It is estimated that from 60 to 70 percent of the crop is grown on rented land. Should wheat prices decline or beef prices increase, the belief is that much of the land now under wheat would revert back to grass.

It is recognized that wheat production cannot be expanded indefinitely at the expense of other agricultural enterprises. If it is to be economic it must provide at the same time for increases in other crops and livestock breeding, especially if it is to avoid the pitfall of single-crop farming. The government, therefore, hopes to develop a program of crop rotation aimed not only at diversification of farming and promotion of soil conservation and improvement, but also at increasing the carrying capacity of the land for livestock.

Special emphasis is being directed toward establishment of a rotation system that will allow more efficient pasture management and an increase in livestock numbers. Brazilian agricultural experts believe that with adoption of appropriate crop rotation systems, sowing of feed and fodder crops, soil improvement, better pasture management, and fencing of fields, the existing number of livestock could be maintained on half the area of grasslands on which they now are carried.

### Flour Milling Capacity

Brazil's flour milling capacity has been greatly expanded during the past two decades. Reductions in flour imports and large increases in imports of wheat reflect the expansion. The country now has a total of 576 registered mills with a reported combined grinding capacity of 19,788.8 metric tons of wheat daily.

Milling capacity is considerably in excess of requirements. Assuming that mills operate only 250 days a year (i.e., closed on Saturday and Sunday and other holidays), they would be capable of grinding 4.9 million metric tons of wheat annually at the reported daily capacity. However, according to the Wheat Expansion Service, a total of only 2.3 million tons of national and foreign wheat were allocated to mills in 1958. Thus, registered milling capacity was more than double the quantity of wheat which had to be ground.

Recognizing the excess capacity, the Wheat Expansion Service has announced its opposition to granting permits for new mills. This agency is obliged to fix annual allocations of national and foreign wheat on the basis of registered milling capacity of individual mills and actual needs of the country. Charges frequently have been made that mills tend to declare fictitious capacities in order to obtain larger quotas.

Most of the mills are located in the wheat producing States of Rio Grande do Sul, Santa Catarina, Paraná, and São Paulo, which contain 33 per cent of the country's population. These States have a total of 555 registered mills with a reported combined grinding capacity of 13,011 metric tons of wheat daily. The largest mills are in the cities of Santos, São Paulo, and Santa Andre in the State of São Paulo; in Antonina and Curitiba in the State of Paraná; in Palegre, Pelotas, Passo Fundo, Uruaiana, and Erechim in the State of Rio Grande do Sul; and in Joinville, Concordia, Mafra, Herval do Oeste, and Cacador in the State of Santa Catarina.

Virtually all of the remaining 21 mills are in the northern States where little or no wheat is grown. Their reported milling capacity is 6,778 metric tons daily. The largest mills there are in the Federal District; in Recife, State of Pernambuco; in Salvador, State of Bahia; in Niteroi, Barra Mansa, and Tres Rios, State of Rio de Janeiro; in Fortaleza, State of Ceará; in Belo Horizonte, State of Minas Gerais; in Belém, State of Pará; in Natal, State of Rio Grande do Norte; in João Pessoa, State of Paraíba; and in Vitoria, State of Espírito Santo.

The wheat and flour requirements of those parts of the country must be supplied either by shipments from southern Brazil or by imports. In former years, a substantial share of the needs was met by imports of flour from the United States, but with the development of the Brazilian flour milling industry more and more has been supplied by local mills. Because of the inadequacy of coastwise shipping and costs of bringing in wheat and flour from Southern Brazil, it would appear to be advantageous to consumers in these northern markets if more of their flour require-

TABLE 18.--Flour: Production imports, total supply, and apparent per capita consumption, 1939-1958

Year	Commercial milling <sup>1</sup>		Flour imports <sup>3</sup>	Total supply <sup>4</sup>	Population <sup>5</sup>	Apparent consumption per capita
	Wheat milled <sup>2</sup>	Flour produced				
	<i>Metric tons</i>	<i>Metric tons</i>	<i>Metric tons</i>	<i>Metric tons</i>	<i>Thousands</i>	<i>Kilos</i>
1939.....	1,026,010	774,948	33,738	808,686	40,289	20.07
1940.....	902,852	675,247	18,029	693,276	41,114	16.86
1941.....	975,425	734,428	17,962	752,390	42,069	17.88
1942.....	1,094,707	866,052	15,609	881,661	43,069	20.47
1943.....	1,077,342	826,477	25,588	852,065	44,093	19.32
1944.....	1,270,274	1,022,192	72,841	1,095,033	45,141	24.26
1945.....	1,184,083	937,795	141,693	1,079,488	46,215	23.36
1946.....	313,450	242,863	244,268	487,131	47,313	10.29
1947.....	367,922	296,920	461,157	758,077	48,438	15.65
1948.....	425,126	326,853	402,219	729,072	49,590	14.70
1949.....	892,891	682,784	133,749	816,533	50,769	16.08
1950.....	1,348,458	1,032,198	6,661	1,039,859	51,976	20.01
1951.....	1,465,281	1,119,596	63,129	1,182,725	53,212	22.23
1952.....	1,355,620	1,016,715	94,334	1,111,049	54,477	20.39
1953.....	1,966,767	1,475,073	30,664	1,505,737	55,772	26.99
1954.....	1,515,626	1,136,719	170,476	1,307,195	57,098	22.89
1955.....	2,585,000	1,938,744	121,797	2,060,541	58,456	35.25
1956.....	2,075,815	1,581,188	53,649	1,634,837	59,846	27.32
1957.....	2,190,241	1,605,566	24,957	1,630,522	61,268	26.61
1958.....	<sup>6</sup> 2,300,000	<sup>7</sup> 1,686,000	<sup>7</sup> 27,200	<sup>7</sup> 1,713,200	62,725	27.31

<sup>1</sup> As reported by the Serviço de Expansão do Trigo, Anuario Estatística do Brasil, 1958.

<sup>2</sup> National and imported wheat.

<sup>3</sup> Comercio Exterior do Brasil, Diretoria Estatística Economica e Financeira, Ministerio da Fazenda.

<sup>4</sup> Disregarding stocks.

<sup>5</sup> Anuario Estatístico do Brasil, 1958.

<sup>6</sup> 1958 allocation to flour mills.

<sup>7</sup> Estimated.

ments were imported directly from the United States. The vast raw material resources of that part of the country and possibilities of expanding the two-way trade with the United States lends support to that thought.

### Prospects for Further Expansion

Brazil's wheat production undoubtedly will increase further. The increase, however, will be at a slower rate than in the past. At average yields of 787 kilos per hectare (11.7 bushels per acre), it would require almost 5 million hectares (12.4 million acres) to produce the anticipated 1970 requirements of 4 million metric tons (147 million bushels).

There is little likelihood that acreage will be expanded to anywhere near that level by 1970. The peak area, reached in 1958, was 1.3 million hectares (3.2 million acres). Higher production costs, because of constantly increasing prices of land, rentals, labor, machinery, fertilizers, construction materials, and other production requisites, are likely to dampen much of the past decade's enthusiasm for wheat.

Success of the wheat expansion program thus far can be attributed largely to the operation of a guaranteed price for national wheat backed up by government control of imports. But the increase has been outbalanced by population growth and higher demand as a result of greater purchasing power and improvements in dietary standards. Thus, wheat imports have also gone up. The upward trend in consumption and imports is expected to continue.

TABLE 19.--Brazilian flour mills: Number and reported daily milling capacity and wheat allocations, 1958

States	Number of mills	Grinding capacity		1958 wheat quotas <sup>1</sup>		
		Daily	Annual <sup>2</sup>	National	Foreign	Total
	Number	Metric tons	Metric tons	Metric tons	Metric tons	Metric tons
Para.....	1	183.0	45,750	7,398	13,871	21,269
Ceara.....	1	226.2	56,550	9,145	17,146	26,291
Rio Grande do Norte....	1	107.4	26,850	4,340	8,142	12,482
Paraiba.....	1	57.6	14,400	2,329	4,366	6,695
Pernambuco.....	2	966.4	241,600	39,067	73,251	112,318
Bahia.....	2	1,102.7	275,675	44,578	83,584	128,162
Espirito Santo.....	1	54.3	13,575	2,195	4,112	6,307
Rio de Janeiro.....	5	698.6	174,650	28,243	52,956	81,199
Federal District.....	4	3,040.9	760,225	122,935	230,503	353,438
Minas Gerais.....	2	286.2	71,550	11,571	21,695	33,266
Mato Grosso.....	1	54.4	13,600	2,200	4,125	6,325
Sao Paulo.....	27	6,576.3	1,644,075	265,861	498,490	764,351
Parana.....	28	932.2	233,050	37,686	70,661	108,347
Santa Catarina.....	123	1,016.8	254,200	41,105	77,072	118,177
Rio Grande do Sul.....	377	4,485.8	1,121,450	181,347	340,026	521,373
Total.....	576	19,788.8	4,947,200	800,000	1,500,000	2,300,000

<sup>1</sup> As announced by the Wheat Expansion Service, Ministry of Agriculture.

<sup>2</sup> Actual number of operating days in a year was not stated. Annual grinding capacity here computed on basis of 250 days' operation.

Wheat Expansion Service, Ministry of Agriculture.

TABLE 20.--Wheat: Quantities milled and flour and byproducts produced, by Brazilian States, 1957

State	Wheat milled	Production	
		Flour	Byproducts
	Metric tons	Metric tons	Metric tons
Pará.....	14,653	11,140	4,098
Ceará.....	28,013	21,010	7,578
Rio Grande do Norte.....	5,795	4,270	1,525
Paraiba.....	8,447	6,241	2,170
Pernambuco.....	131,286	101,505	28,525
Bahía.....	117,082	87,611	27,923
Minas Gerais.....	27,349	20,592	7,247
Espirito Santo.....	8,021	6,032	2,007
Rio de Janeiro.....	80,825	62,376	20,206
Distrito Federal.....	405,884	304,586	102,279
São Paulo.....	754,880	572,547	185,525
Paraná.....	72,065	53,874	18,337
Santa Catarina.....	105,147	79,350	26,455
Rio Grande do Sul.....	423,559	269,007	88,311
Mato Grosso.....	7,235	5,424	1,811
Total.....	2,190,241	1,605,565	523,997

Anuario Estatística do Brasil, 1958.



Further increases in production will depend on competition of other agricultural enterprises for use of the land; adoption of soil conservation and efficient crop rotations; increased yields; reduction in production costs; provision of adequate credit; improvements in transportation and farm storage; availability of tractors, combines, and other machinery; continuation of the price support policy; and extent to which costs of a guaranteed producer price and other production incentives can be kept within limits which consumers are willing and able to pay. The latter is an important consideration since political expediency requires that bread and other wheat products be available at reasonable prices.

However, Brazilian wheat growers are becoming better organized each year. In addition, they have the support of strong local forces, which wish to see Brazil become self-sufficient to the maximum extent possible. Still, there is little likelihood of the country's wheat production being expanded within the next 10 or 15 years to a point sufficient to take care of more than 30 to 35 percent of the anticipated requirements.

Consequently, large-scale wheat imports will continue to be necessary. But it can be expected that Brazil will try to obtain its import requirements through bilateral or other trade agreements which will not put a strain on foreign exchange or force curtailment of imports of essential industrial raw materials and equipment.

With further improvements in the country's economic and trade position, there should be a large market for imported wheat. Supporting this conclusion are soil and climatic conditions that are not particularly favorable to wheat production; an estimated annual increase of  $2\frac{1}{2}$  percent in population; expanding industrialization and labor shifts from rural to urban areas; expected increases in wheat consumption as a result of improvements in purchasing power and dietary standards; and availability of abundant supplies of wheat at favorable prices from the United States, Argentina, Uruguay, and other countries.















